DECLASSIFIED
Authority NND735022

SECRET

700

REPORT

of

The Infantry Board

No. 1532

WEAPONS FOR JUNGLE WARFARE (INCLUDING COMPARISON OF P.I.A.T. AND LAUNCHER, ROCKET, M1A1)

FORT BENNING, GEORGIA

30 October 1943

SECRET

24725—Benning, Ga., 9-16-42—2,000

DECLASSIFIED
Authority NND735022

OFFICE OF

THE INFANTRY BOARD

FORT BENNING, GEORGIA

IB-471.6 30 October 1943.

Subject: Weapons for Jungle Warfare (Including Comparison of P.I.A.T. and Launcher, Rocket, M1A1).

To: Chief of Ground Requirements Section, Army Ground Forces, Army War College, Washington, D. C.

1. Authority. Letter, GNRQT-11/52734, 471.94/12(S) (4 Sep 43) to President, The Infantry Board (Appendix "A").

2. Purposes of Tests. a. To determine which present Infantry weapons are the most effective for the reduction of Japanese type pill boxes and bunkers in jungle warfare.

b. To determine whether there are requirements for new type Infantry weapons for use against Japanese pill boxes and bunkers.

c. To determine probable tactical employment of present standard Infantry weapons against Japanese pill boxes and bunkers.

3. Background. a. Many reports from the Southwest Pacific have described the extreme difficulty encountered by our troops and those of our allies in the reduction of Japanese pill boxes and bunkers installed in thick jungle country. If it is possible to bring artillery, tanks, anti-tank guns, or Infantry cannon into position, the problem is not too great, but in jungles where these heavy weapons cannot be transported, the problem has to be solved with weapons which can be man-carried and for which additional ammunition can be supplied by air. Jungles so thick and mountainous country so difficult that not even pack animals can be employed have been described and, in this type of country, only the lightest Infantry weapons can be transported.

b. Correspondence contained in Appendix "B" of this report describes efforts being made by the Ordnance Department to provide the Infantry with light weapons for jungle warfare. Among those already available are hand

FOR VICTORY BUY UNITED STATES WAR BONDS AND STAMPS

SECRET

DECLASSIFIED
Authority NND735022

grenades, rifle grenades, 2.36" Rocket Launchers, 60mm mortars and 81mm mortars. Among the new developments are 4.5" rockets fired from their packing containers, mortars modified to permit flat trajectory fire, white phosphorus rifle grenades and 60mm mortar shells, air burst fuzes for the 81mm mortar and a very light 37mm gun mounted on a Caliber .50 machine gun tripod.

c. Tests of jungle warfare weapons conducted by The Infantry Board in accordance with the Directive (Appendix "A") commenced with a comparison of the British P.I.A.T., "Bazooka" and M9A1 rifle grenade. The tests were then expanded to include all other weapons now available to Infantry which, it was considered, might be effective in the reduction of Japanese pill boxes and bunkers. Pill boxes without complete earth cover were made of both hard and soft wood logs and bunkers with several feet of earth cover were constructed according to the plans outlined in Plates IV and V, furnished by the Office of the Chief of Engineers. These installations were located in terrain approximating jungle conditions as nearly as was possible on the Fort Benning Reservation. On September 23, 1943, preliminary tests against these replicas of Japanese pill boxes and bunkers were conducted in the presence of Col. F. R. Fuller, Infantry Branch, GNRQT, Colonel S. B. Ritchie, Office of the Chief of Ordnance, Major Dawson, Australian Army, several other War Department observers and representatives of the faculty, The Infantry School.

4. Summary of Results of Tests. a. British P.I.A.T. Has an accuracy comparable to the M9A1 rifle grenade (Tests Nos. 1 and 2). Has a penetrative effect superior to the M9A1 grenade and 2.36" rocket when fired against a solid vertical surface (Test No. 3) but its bombs are almost 100% duds when fired against soft earth (Tests Nos. 4, 6 and 7).

b. M9A1 Rifle Grenade. Is as accurate as the British P.I.A.T. bomb (Tests Nos. 1 and 2) but has less penetrative effect (Test No. 3). Will explode on soft earth (Tests Nos. 4, 6 and 7). Should be fired at bunker apertures from as short a range as possible, preferably 25 yards (Test No. 17). Will blind apertures and do considerable inside damage when projected through apertures (Test No. 20).

SECRET

DECLASSIFIED
Authority NND735022

c. MKII Fragmentation Grenades with M1 Adapter. Are not suitable for projection through apertures unless firer is under cover at short range (Test No. 18). Are less potent than M9A1 grenades (Test No. 18).

d. 2.36" Rockets. Are more accurate than the British P.I.A.T. and M9A1 grenade (Tests Nos. 1 and 2). Are deflected by their pointed ogives, thereby losing much of their penetrative power (Tests Nos. 3, 4, 7, 16 and 21). Should be provided with blunt nosed ogives (Tests Nos. 19 and 22). Should be fired at apertures from minimum range, preferably 50 yards or less (Test No. 22).

e. 2.36" Launchers M1A1. Have excessive muzzle blast into the firer's face and should be provided with tube extensions and a one-piece sight (Test No. 22).

f. 60mm Mortars. Are ineffective against heavy pill boxes and bunkers with H.E. shell but very effective with T6 W.P. shell (Tests Nos. 10 and 27).

g. 81mm Mortars. Are very effective against bunkers using M56 shell with delay fuze and M57 W.P. shell, but require a large expenditure of ammunition to obtain direct hits (Tests Nos. 11 and 23).

h. .50 Caliber M.G's. Are generally ineffective on their low tripod which makes unaimed fire necessary when firing through brush, (Test No. 24).

i. 37mm and 57mm A.T. guns. Are effective for attacking apertures but are probably too heavy to be transported in thick jungle (Tests Nos. 12 and 13).

j. 105mm Howitzers. Are very effective against pill boxes and bunkers with H.E. shell and delay fuze but are probably too heavy to be transported in thick jungle (Test No. 14).

k. 4.5" Rockets. Are very effective against pill boxes and bunkers but have excessive dispersion unless fired at very short range (Tests Nos. 8, 9 and 15).

5. Discussion. a. The 37mm and 57mm guns and the 105mm Howitzer all are good weapons for use against Jap type

SECRET

DECLASSIFIED
Authority NND735022

bunkers but the difficulty of their transport in thick or mountainous jungle rules them out of any further discussion herein.

b. The British P.I.A.T. is not a good weapon for jungle work because it must be fired from the prone position and cannot be aimed in ground vegetation. Furthermore, its bombs are almost 100% duds when striking soft earth.

c. The M9A1 grenade fired from very short range at pill box apertures is an excellent weapon. If fired from ranges in excess of 50 yards, its arched trajectory causes it to explode on the aperture lip and not drive straight through. It weighs only 1-1/4 pounds and can be fired by one man at the rate of 6 rounds per minute. It will penetrate two soft wood logs when fired at 90° but it should not be fired at 60° or 45° from the line of fire of the pill box aperture unless it is desired to blind the aperture by blasting in dirt.

d. The 2.36" rocket can be fired through apertures from 50 yards or less. At greater ranges and oblique angles its pointed ogive and arched trajectory cause it to be deflected. It should be provided with a blunt ogive and sensitive fuze to insure detonation. (The metal cup shown in Plate XXVIII is an expedient remedy.) These rockets weigh 3-1/2 lbs. and can be fired by one man at the rate of four rounds per minute. The Launcher weighs 14-1/2 lbs., and makes more noise and flash than the M9A1 grenade.

e. W.P. smoke from the 60mm and 81mm mortar is a valuable blinding agent and burning W.P. entering an aperture will produce casualties inside the pill box. There is an urgent need for a W.P. companion to the M9A1 grenade and 2.36" rocket. The T5 W.P. rifle grenade should be extremely useful.

f. The heavy H.E. 81mm shell M56 is very valuable for attacking the body of the pill box or bunker. The mortars should be brought in as close as possible (say 300 yards) in order to reduce dispersion. There is a need for a flat trajectory method of firing this mortar shell in order to increase accuracy. At high angles no more than one direct hit per five rounds should be expected.

SECRET

DECLASSIFIED
Authority NND735022

g. The 4.5" rocket with delay fuze, fired from a man-carried tube at very short range is another urgent need. Steps should be taken to improve its accuracy for longer range fire. Its destructive effect should prove to be equal to that of the 105mm howitzer.

6. Tactics. While no actual tactical tests were conducted, observation of these technical tests leads to certain tactical conclusions. Disregarding any weapon that cannot be man-carried and considering only the weapons the Infantry now has, one method for reducing a Japanese pill box or bunker area follows:

a. Find the Japanese installations.

b. Bring in 81mm mortars as close as possible and bombard the area with M56 shell and delay fuze while using automatic small arms to clear snipers out of trees.

c. Follow the bombardment with W.P. smoke from the mortars.

d. Under cover of the smoke bring up Bazookas to 50 yards or less and M9A1 rifle grenadiers to 25 yards and shoot at all apertures.

e. Mop up with hand grenades.

7. Conclusions. The Infantry Board concludes that:

a. The British P.I.A.T. is not a suitable jungle warfare weapon.

b. The M9A1 rifle grenade is effective against bunkers when fired through apertures at short range.

c. The 2.36" rocket should have a blunt ogive and sensitive fuze similar to the M9A1 grenade. Some positive means of eliminating back blast into the firer's face should be provided.

d. There is an immediate need for a W.P. rifle grenade and a W.P. 2.36" rocket. (These may prove to be almost as successful as flame throwers.)

SECRET

DECLASSIFIED
Authority NND735022

e. The adoption and issue of the T6 W.P. 60mm shell should be expedited.

f. A flat trajectory method of firing the 81mm mortar should be developed without delay.

g. Man-carried tubes for firing the 4.5" rocket should be provided without delay and steps should be taken to improve the accuracy of the projectile.

8. Recommendations. The Infantry Board is continuing work on this project and will submit further reports as new weapons or technique are developed. Meanwhile, it is recommended that immediate steps be taken reference paragraphs 7 c to g, above.

For the President:

INGOMAR M. OSETH,
Colonel, Infantry,
Director.

SECRET

DECLASSIFIED
Authority NND735022

SECRET

REPORT of TEST

WEAPONS FOR JUNGLE WARFARE (INCLUDING COMPARISON OF P.I.A.T. AND LAUNCHER, ROCKET M1A1).

COLONEL CHARLES H. COATES
[redacted]

THE INFANTRY BOARD
FORT BENNING, GEORGIA

Submitted to
THE INFANTRY BOARD

Copy No. 1 Date 22 October 1943

1659 BENNING 8-16-43 1,000

SECRET

DECLASSIFIED
Authority NND735022

THE INFANTRY BOARD
FORT BENNING, GEORGIA.

22 OCTOBER 1943

SUBJECT: WEAPONS FOR JUNGLE WARFARE
(INCLUDING COMPARISON OF P.I.A.T. AND LAUNCHER, ROCKET M1A1)

TO: THE PRESIDENT, THE INFANTRY BOARD, FORT BENNING, GEORGIA

SECRET

DECLASSIFIED
Authority NND735022

I AUTHORITY AND REFERENCES

1. Authority:

Letter, GNRQT-11/52734, 471.94/12 (S) (4 Sep 1943) to The President, The Infantry Board, 4 September 1943. (Appendix "A".)

2. References:

Letter, GNRQT-11/54894, 470 (S) (22 Sep 1943) to The President, The Infantry Board, 22 September 1943, with three inclosures. (Appendix "B".)

II PURPOSE OF TEST

3. a. To determine which Infantry weapons are the most effective for the reduction of Japanese type pill boxes and bunkers in jungle warfare.

b. To determine whether there are requirements for new type Infantry weapons for the reduction of Japanese type pill boxes and bunkers in jungle warfare.

c. To determine probable tactical employment of Infantry weapons in jungle warfare.

III DETAILS OF TESTS AND RESULTS

4. Test No. 1

a. Purpose: To determine the comparative accuracy of the M9A1 grenade, 2.36" rocket, and P.I.A.T. bomb.

SECRET

DECLASSIFIED
Authority NND735022

b. Method: A 6' x 6' screen was set up at 100 yards and three M7A1 rockets were fired with the rocket launcher M1A1 in a machine rest. The process was repeated with the rocket launcher T21E2 (2 piece). Then three M11A2 grenades were fired from a rifle set in the machine rest. Finally, three practice bombs were fired from a British P.I.A.T. set in a sandbag rest.

c. Results: (See Plate I.) Although this firing was brief due to the very small amount of ammunition then available, it indicated that the rocket launchers M1A1 and T21E2 were surprisingly accurate at 100 yards; that both were more accurate than the P.I.A.T. and rifle grenade; and that the P.I.A.T. and rifle grenade M11A2 were of about equal accuracy.

5. Test No. 2

a. Purpose: To further determine the accuracy of the P.I.A.T., rifle grenade, and Bazooka.

b. Method: A leaning wall of pine logs about 1' in diameter and two logs thick was constructed. The size of the wall was 12' x 12'. An aperture 36" long and 20" high was cut in the center of the wall, representing a typical Japanese machine gun embrasure. Six practice rounds were fired from the Launcher M1A1, Launcher T21E2, P.I.A.T., and Rifle Grenade Launcher, from a range of 100 yards, all shots being aimed at the aperture in the wall.

c. Results: (See Plate II.) This firing indicated that the Bazooka practice rocket was more accurate than either the rifle grenade or the P.I.A.T., and that the rifle grenade and P.I.A.T. were of approximately equal accuracy.

6. Test No. 3

a. Purpose: To determine the penetrative effect of the M9A1 rifle grenade, M6A1 rocket, and P.I.A.T. bomb on logs.

b. Method: Five shots with each of the three types of projectiles were fired at the aperture in the log

SECRET

DECLASSIFIED
Authority NND735022

wall shown in Plates VI, VII, VIII, IX, X and XI. Four additional shots with the M6A1 rocket were fired subsequently for check.

c. Results:

(1) (See Plate VI.) Of the five M9A1 grenades fired at the log wall aperture from 100 yards, four hit the wall and one went over the top of the wall. Two penetrated between cracks in the front logs and continued through the back logs. Two hit at the base of the wall and did not penetrate as there were three feet of earth behind the base of the wall. (See Plate VII.)

(2) All five shots from the P.I.A.T. at 100 yards hit the wall. Two completely penetrated two logs. One enlarged a hole previously made by an M9A1. Two did not penetrate the wall because they hit at the base where there were three feet of earth behind the wall. (See Plate VIII.) Plate IX shows the complete two-log penetration of two shots P.I.A.T.

(3) Of the first five M6A1 rockets, one went over the top of the wall and was a dud. One went through a crack between front logs and penetrated one back log. Two were deflected upward and downward by their pointed ogives hitting the round front logs and each failed to drive straight through. One was a dud in the earth at the base of the wall. (See Plate X.) Of the four M6A1 rockets subsequently fired, one went through the aperture in the wall and penetrated a 2' gum tree 20 yards in rear. Two were complete penetrations of two logs. One was deflected downward by its pointed ogive and failed to penetrate even the front log. (See Plate XI.)

7. Test No. 4

a. Purpose: To determine the effect of the M9A1, P.I.A.T., and M6A1 on the aperture of a Type C bunker.

b. Method: Three rounds of each type projectile were fired at the bunker aperture from 100 yards.

c. Results:

DECLASSIFIED
Authority NND735022

(1) Of the three M9A1 grenades fired, one hit the aperture, knocked in considerable dirt, and collapsed one crossed silhouette inside, indicating blast effect. Another added to the general effect of the first shot. The third exploded in the earth in front of the aperture and did no damage. (See Plate XII.)

(2) Of the three P.I.A.T. bombs fired, all were duds in the earth above the aperture. (See Plate XIII.)

(3) Of the three M6A1 rockets fired, two were duds buried in the earth above the aperture. The third skidded through the aperture, was deflected against the back wall of the bunker, and failed to explode.

8. Test No. 5

a. Purpose: To determine the effect of rapid fire of M9A1 grenades at the aperture of a three-log, soft wood pill box.

b. Method: Three grenadiers fired three grenades each from 75 yards. One grenadier was equipped with the M1 rifle and M7 launcher without sight; one grenadier was equipped with the M1903 rifle and M2 launcher with experimental bar-type sight; the third grenadier was equipped with the carbine and M8 launcher without sight. Each grenadier fired three grenades in 30 seconds.

c. Results: The lack of sights on two of the weapons resulted in considerable dispersion. Two grenades exploded on the lip of the aperture. Two grenades exploded on the butts of logs. There was evidence of blast effect inside the pill box and some fragmentation on the back wall. Five rounds exploded in the earth outside of the pill box and did no damage. (See Plate XIV.)

9. Test No. 6

a. Purpose: To determine whether a wire mesh screen placed in front of the bunker aperture would defeat the M9A1 grenade, P.I.A.T. bomb, and M6A1 rocket.

b. Method: Three shots of each type projectile were fired at the bunker aperture in front of which was set a screen of chicken wire.

DECLASSIFIED
Authority NND735022

SECRET

c. Results:

(1) Of the three P.I.A.T. bombs fired, all went through the chicken wire, hit the soft earth around the aperture and were harmless duds.

(2) Of the three M6A1 rockets fired, all went through the chicken wire and two were duds in the soft earth. The third exploded just above the aperture, blinding it with earth but causing no damage inside of the bunker. (See Plates XVI and XVIII.)

(3) Of the three rounds M9A1 fired, the first detonated on the chicken wire blasting a large hole in it. Two others were fired through this large hole and threw earth into the aperture, blinding it. (See Plate XVII.)

10. Test No. 7

a. Purpose: To determine the effect of firing M9A1 grenades, P.I.A.T. bombs and M6A1 rockets at the aperture of a Type C pill box from long range at high angle.

b. Method: Three M9A1 grenades were fired using 20-grain auxiliary cartridges to project them 300 yards. Then three P.I.A.T. bombs were fired from 300 yards (which approaches the maximum range of the P.I.A.T.). Finally, three M6A1 rockets were fired from 300 yards with the firer in the standing position.

c. Results:

(1) Of the three M9A1 grenades fired, all detonated near the bunker aperture but did no damage due to their dispersion.

(2) Of the three P.I.A.T. bombs fired, all were duds.

(3) Of the three M6A1 rockets fired, all were deflected from the ground by their pointed ogives and were duds.

SECRET

DECLASSIFIED
Authority NND735022

11. Test No. 8

a. Purpose: To determine whether a Type C bunker could be hit with 4.5" Army rockets fired from short range.

b. Method: An improvised plastic launcher tube was set up on sandbags at a range of 150 yards from the aperture of a Type C bunker. The tube is shown in Plate XIX, weighs 16-1/2 pounds, and is 96 inches long. It could probably be man-carried in the jungle. Firing was done electrically by remote control. One sand-loaded rocket was fired, followed by two H.E. rockets.

c. Results:

(1) The sand-loaded rocket went through the earth just to the side of the aperture, penetrated the one-log soft wood wall, penetrated the one-log baffle wall and came to rest in the back entrance of the bunker. It had the general effect of a heavy armor-piercing shell. Had it been loaded with high explosive and a delay fuze, it would have undoubtedly neutralized the bunker. (See Plate XX.)

(2) Of the two H.E. 4.5" rockets fired, one went over the top of the bunker and was a dud. The other hit the earth on top of the bunker and exploded but did no damage inside. (Both these H.E. rockets were equipped with instantaneous fuzes, no delay fuzes being available.)

12. Test No. 9

a. Purpose: To determine whether a Type C bunker could be hit with 4.5" Navy rockets fired at short range.

b. Method: Three sand-loaded Navy rockets were fired at the bunker at a range of 300 yards from a single rail projector. (No high explosive heads were available for test. Therefore, this test was for accuracy only.)

c. Results: The projector being of the single rail type, is very light and can easily be carried by one man in the jungle. Of the three Navy rockets fired, one hit the side of the bunker and, if equipped with a delay

SECRET

DECLASSIFIED
Authority NND735022

SECRET

fuze would probably have done considerable damage. The other two were over and short and would have done no damage. Indications were that these Navy rockets have considerable dispersion even at short range.

13. Test No. 10

a. Purpose: To determine whether the 60mm mortar is an effective weapon for use against pill boxes at short range.

b. Method: Three 60mm H.E. shells M49A2 were fired at a Type C pill box from 300 yards at high angle.

c. Results: These shells, because of their arched trajectories could not be projected through the bunker aperture and, when fired at high angle, do not damage the bunker's earth cover.

14. Test No. 11

a. Purpose: To determine whether the 81mm H.E. M56 shell with delay fuze is effective against Type C pill boxes.

b. Method: Three rounds of 81mm M56 shell with delay fuze were fired from a range of 300 yards at high angle.

c. Results: Of the three rounds fired one hit the front of the bunker and closed the aperture with dirt, although there was no damage inside. Two others were misses without destructive effect, although they dug considerable craters in the adjacent earth. (Indications were that this shell would be highly effective if hits could be obtained and a subsequent test, No. 24, fully determines this shell's effectiveness.) (See Plate XXI.)

15. Test No. 12

a. Purpose: To determine the effect of the 37mm gun when fired at short range at the aperture in a Type C bunker.

SECRET

DECLASSIFIED
Authority NND735022

b. Method: Three rounds of 37mm A.P. were fired at the bunker aperture from 300 yards.

c. Results: Penetrations were secured through the one-log front wall of the bunker and the one-log back wall. If 37mm high explosive ammunition with armor-piercing cap had been available there might have been considerable damage to the gun crew inside of the bunker. However, it is doubtful that the 37mm gun could be brought into firing position in thick jungle country. (See Plate XX.)

16. Test No. 13

a. Purpose: To determine the effect of the 57mm gun on a Type C bunker when fired at short range.

b. Method: Three rounds of armor-piercing 57mm shells were fired at the bunker aperture from 300 yards.

c. Results: Penetrations were secured of the one-log front wall in the near vicinity of the aperture. The back baffle wall was also penetrated. Had H.E. ammunition with armor-piercing cap been available, there might have been considerable damage to the gun crew inside. However, it is doubtful that the 57mm gun could be transported into firing position in thick jungle country. (See Plate XX.)

17. Test No. 14

a. Purpose: To determine the effect of the 105mm Howitzer on a Type C bunker when fired at short range.

b. Method: Four rounds of 105mm M48 shells with .15 second delay fuzes were fired at the aperture of a Type C pill box from 300 yards.

c. Results: Of the four rounds fired, one hit the top of the pill box, exploded, cut a gash in the earth but did no damage inside. Two hit the 6' earth covering over the pill box and dug large craters but did no damage inside, although a paper-blast screen was blown down, indicating considerable concussional effect. The fourth round penetrated 3' of earth and tore a large hole 3' in diameter in the three-log roof of the bunker. Several logs were knocked completely

SECRET

DECLASSIFIED
Authority NND735022

out of place and shattered. A hatful of fragments were picked up inside the bunker. All silhouettes placed inside were ripped to pieces and complete destruction of the enemy gun crew was certain. (See Platex XXII to XXV, inclusive.)

18. Test No. 15

a. Purpose: To further determine the effect of the 4.5" high explosive rocket when fired at short range at a Type C bunker.

b. Method: A 4.5" H.E. rocket was fired by remote control from the 96" plastic tube shown in Plate XIX at a range of 150 yards.

c. Results: A tree burst was secured 20 feet high and 100 yards in rear of the pill box, indicating that bunkers can probably not be hit with single rounds and that several rockets will probably be necessary owing to their dispersion.

19. Test No. 16

a. Purpose: To determine the effect of firing M9A1 grenades, P.I.A.T. bombs, and M6A1 rockets at pill box apertures from angles of 45 and 60 degrees and to determine whether the blast penetrates the pill box at these angles.

b. Method: A pill box constructed of soft wood pine, according to the instructions contained in paragraph 3 of the directive (Appendix "A") was used as a target. Three projectiles of each type were fired at the aperture from 45 and 60 degrees, at a range of 75 yards.

c. Results:

(1) Three M9A1 grenades fired from 45 degrees exploded in front of the aperture but did no damage inside. The same was true at 60 degrees.

(2) Three rounds P.I.A.T. fired at 45 degrees were all duds. The same was true at 60 degrees.

(3) Three rockets M6A1 fired at 45 degrees were deflected by their pointed ogives and were all duds. The same was true at 60 degrees.

SECRET

DECLASSIFIED
Authority NND735022

20. Test No. 17

a. Purpose: To determine the ranges at which reasonable success can be attained in firing M9A1 grenades through bunker apertures.

b. Method: An attempt was made to fire M9A1 grenades through the aperture of a Type C bunker from 50 yards. Then the process was repeated from 25 yards.

c. Results:

(1) At 50 yards the first shot hit just above the aperture, exploded but did no damage inside the bunker. The second shot was 10 yards short, exploded but did no damage. A third shot exploded in the earth above the aperture and did no damage. The fourth shot exploded in the earth to the right of the aperture and did no damage. The fifth shot exploded on the lip of the aperture and did no damage other than blast effect.

(2) At 25 yards the first shot exploded on the lip of the aperture and did no damage other than blast effect. The second shot entered the aperture, penetrated three logs and did considerable damage inside.

(3) The above firing indicated that reasonable success (one shot in three through the aperture) can be secured at minimum range, preferably 25 yards. At greater ranges the curved trajectory of the M9A1 grenade causes it to explode on the lip of the aperture and not to drive straight through (apertures being approximately four feet deep).

Note: This test was not repeated with P.I.A.T. bombs and M6A1 rockets because previous tests had shown that these two projectiles had an extremely large percentage of duds.

21. Test No. 18

a. Purpose: To determine whether Mk. II fragmentation grenades with projection adapters could be fired through the aperture of the Type C bunker at short ranges.

DECLASSIFIED
Authority NND735022

b. Method: Two gunners fired three rounds each at the aperture from 50 yards, this minimum range being necessary for protection of the gunners themselves from flying fragments.

c. Results: None of the six rounds fired entered the aperture. Two of the first four hit in the aperture mouth but caused no damage inside. Three more were wild and caused no damage. The sixth hit in the mouth of the aperture but caused no damage. Indications were that this grenade is much less suitable for the purpose than the M9A1 grenade.

22. Test No. 19

a. Purpose: To develop an expedient method of insuring detonation of M6A1 rockets.

b. Method: Three M6A1 rockets with expedient ogives and one standard rocket were fired at a Type C bunker aperture from 50 yards.

c. Results:

(1) One rocket had the wooden ring from the carton placed over the ogive as shown in Plate XXVI. It landed in the earth, the wooden ring split up and it failed to explode.

(2) Another rocket had the ogive from a M11A2 practice rifle grenade placed over its own ogive. It was a dud, the added ogive apparently being ineffective.

(3) A third rocket had a cup of sheet metal placed over its ogive as shown in Plate XXVII. This rocket detonated on soft earth where other rockets had all been duds.

(4) A fourth M6A1 rocket with standard pointed ogive skidded through the aperture, was deflected, hit the back wall and failed to detonate.

(5) The need for a blunt ogive on the M6A1 rocket seemed clearly indicated.

SECRET

DECLASSIFIED
Authority NND735022

SECRET

23. Test No. 20

a. Purpose: To further determine the range for placing M9A1 grenades through pill box apertures and to determine the effect of firing such grenades through light brush and tall grass.

b. Method: A three-log soft wood 6' x 6' pill box without dirt covering was selected as a target. There was light brush in front of the aperture and firing was done through tall grass and this brush with the firer in the kneeling position. A M1903 rifle with experimental bar sight adjustable to 2-1/2 degrees change in elevation was used at 50 yards. The aperture was 36" wide, 12" high, and 36" deep.

c. Results:

(1) Of three M9A1 grenades fired, the first shot hit the right side of the aperture and blasted away the shoulder of a crossed silhouette set up inside. The second shot was over. The third shot was about 1-1/2 feet short, with no blast effect inside.

(2) This firing indicated that 50 yards is the ~~optimum~~ maximum range at which M9A1 grenades should be employed against pill box apertures. (See Plates XXIX and XXX.) It further indicated that these grenades can be fired through tall grass and light brush.

24. Test No. 21

a. Purpose: To further determine the range for firing M6A1 rockets through pill box apertures and to determine the effect of firing these rockets through light brush and tall grass.

b. Method: Three rockets were fired from 50 yards at the same pill box used in Test No. 20.

c. Results:

(1) Of the three rockets fired, the first was a dud in the earth to the right of the aperture. The second bounced inside the pill box but the head broke off and it

SECRET

DECLASSIFIED
Authority NND735022

was a dud. The third hit the lip of the aperture and there was considerable blast effect inside. (See Plate XXXI.)

(2) This firing indicated that M6A1 rockets can be fired through high brush and tall grass.

25. Test No. 22

a. Purpose: To further test the effect of placing blunt cups over pointed ogives for decreasing the number of rocket duds in soft earth and to determine the general effect of these cups on ballistics.

b. Method: Three of the five rockets shown in Plate XXVIII as being equipped with blunt cups over ogives, were fired at the pill box shown in Plate XXXII. This pill box had a 6' x 6' three-log hardwood wall and three-log hardwood roof with 3' of earth all around. Firing was done from 50 yards with the Bazooka shown in Plates XXXV and XXXVI. Following this two rounds with blunt cups were fired on hard earth at 300 yards.

c. Results:

(1) Of the first three rockets fired, the first hit in soft dirt one foot above the aperture and exploded. (A hit there with a pointed ogive had previously been a dud.) The second exploded on the top log of the aperture and the direction of the blast was not deflected. It penetrated three one-foot hardwood gum logs. The third shot hit in soft dirt and exploded (a hit there with a pointed ogive rocket had previously been a dud).

(2) The two rockets with blunt cups over ogives fired from 300 yards - both exploded. (Rockets with pointed ogives had previously skidded at this range and been duds.) Both cupped rockets fell short and wobbled in flight, indicating that at the longer ranges the cup affects ballistics by making the rockets somewhat nose-heavy. This ballistic effect was not apparent at 50 yards (See Plates XXXII and XXXIII).

(Note: The use of the tube extension shown in Plates XXXV and XXXVI completely eliminated back blast into the firer's face which had been very bothersome with the M1A1 launcher.)

SECRET

DECLASSIFIED
Authority NND735022

26. Test No. 23

a. Purpose: To further determine the effect of the 81mm M56 shell with delayed fuze on the Type C bunker.

b. Method: An 81mm mortar was set up at 300 yards from a Type C bunker with a one-log hardwood wall, three-log hardwood roof, and a covering of 6' of loose earth all around. Three H.E. M56 rounds with delay fuzes were fired for adjustment and then six M56 rounds were fired for effect. The bunker was inspected following which six more M56 rounds were fired for effect.

c. Results:

(1) Of the nine M56 rounds fired initially two were direct hits, and collapsed the back entrance to the bunker as shown in Plates XXXVII and XXXVIII. The others, due to their natural dispersion, fell around the bunker, blew large craters in the ground but caused no damage to the bunker.

(2) Of the six additional rounds fired, one was a direct hit, another fell in front of the aperture and closed it with earth, while the remainder, due to their natural dispersion, fell around the bunker without damage.

(3) By removing blown-out logs, an inspecting party was able to enter the bunker and found a paper-blast screen completely torn away, indicating considerable concussional effect. A hole in the roof of the bunker is shown in Plates XXIX and XL.

27. Test No. 24

a. Purpose: To determine the effect of firing the Caliber .50 machine gun at the aperture in a pill box from short range.

b. Method: 100 rounds of Caliber .50 A.P.I. ammunition was fired at the aperture in a three-log 6' x 6' soft wood pill box from 150 yards through tall grass.

c. Results: There were no penetrations of the pill box and no evidence of damage inside. The low mount of this weapon in the tall grass made it impossible to deliver aimed fire.

DECLASSIFIED
Authority NND735022

28. Test No. 25

a. Purpose: To compare the weights of the M9A1 grenade and launcher, the P.I.A.T. and bomb and to Bazooka and rocket and to compare their respective rate of fire, noise, flash and ability to be put into action and fired by a single individual.

b. Method: By weighing, by observation and by conduct of timed firing tests.

c. Results:

	M9A1	P.I.A.T.	Bazooka
Weight of weapon	12 oz(Launcher)	36-1/4 lbs.	14-1/2 lbs.
Weight of projectile	1-1/4 lbs.	2-5/8 lbs.	3-1/2 lbs.
Rate of fire (1 man)	6 R.P.M.	5 R.P.M.	4 R.P.M.
Noise	Least	Medium	Most
Flash	Least	Medium	Most
Operation by 1 man ?	Yes	Yes	Yes

29. Test No. 26

a. Purpose: To determine the effect of a multi-barreled 2.36" rocket launcher on a pill box aperture.

b. Method: Five Bazookas were mounted on the LMG M2 tripod as shown in Plates XLII and XLIII. A remote control electrical firing mechanism was devised and the multi-barrel weapon set up at 50 yards from the pill box aperture.

c. Results:

(1) The five barrel group weighs 75 pounds, tripod weighs 16 pounds, and battery weighs 9 pounds. The total weight is approximately 100 pounds.

(2) Ripple fire of five M9A1 rockets was accomplished in 10 seconds.

(3) All five rockets were duds in the earth around the pill box aperture. The head of one broke off.

SECRET

DECLASSIFIED
Authority NND735022

This multi-barrel arrangement introduced greater dispersion than had previously been the case with five shots aimed individually.

30. Test No. 27

a. Purpose: To determine the effect of a white phosphorus 60mm T6 shell exploded in front of a pill box aperture.

b. Method: The 6' x 6' earth-covered pill box shown in Plate XLIV was used as a target. A 60mm white phosphorus T6 shell was placed as shown in Plate XLV and exploded statically.

c. Results:

(1) Thirty seconds after explosion the white phosphorus smoke blinded the pill box as shown in Plate XLVI.

(2) Considerable white phosphorus entered the aperture and a cloud of smoke poured from the aperture and back entrance for three minutes as shown in Plates XLVII and XLVIII.

(3) The top log of the aperture was set on fire as shown in Plate XLIX.

(4) The "gunner" received white phosphorus burns as shown in Plate L.

Charles H. Coates
CHARLES H. COATES,
Colonel, Infantry,
Board Member in Charge.

DECLASSIFIED
Authority NND735022

GROUND REQUIREMENTS SECTION

Headquarters
ARMY GROUND FORCES
Army War College
Washington, D.C.

471.94/12 (S) (4 Sep 1943)
GNRQT-11/52734

4 September 1943

SUBJECT: Comparative Tests of Projector Infantry Antitank (P.I.A.T.) and Launcher Rocket M1A1.

TO: President, Infantry Board, Fort Benning, Georgia.

1. There are being shipped to the President, Infantry Board, the following munitions: 48 rounds P.I.A.T.
50 Rockets M6A1.

2. Upon receipt of the above ammunition, it is desired that comparative tests be conducted using same against Japanese type pill boxes or bunkers.

3. As far as can be ascertained, the Japanese have not been consistent in the construction of their pill boxes either with regard to dimensions, type of logs, or thickness of logs used. However, information available indicates that the dimensions of one type of pill box are six (6) feet square and three (3) feet deep. At ground level a wall of three log thickness and two logs high is constructed. A roof of two log thickness covered with earth is added. Embrasures sufficient in size to accommodate weapons of the water-cooled machine gun type approximately 36" long and 20" high, other embrasures to accommodate air-cooled weapons and small arms approximately 18" long and 5" high are constructed in the wall. Embrasures vary in distance from the ground. The position of the embrasure is determined by the terrain which is commanded by the pill box. Entry into the pill box is by communication trench. It is desired that pill boxes be constructed of both hard and soft wood, and located in wooded areas in order to simulate jungle conditions.

4. It is desired that tests include the following:

a. What penetration and fragmentation has this ammunition when used against pill boxes of hard wood and soft wood, fired at 90, 60, and 45 degree angles.

b. Does the blast penetrate into the pill boxes at the above angles.

APPENDIX "A"

COPY

SECRET

DECLASSIFIED
Authority NND735022

c. At what ranges can reasonable success be attained in firing into the bunkers thru embrasures of different sizes. "Reasonable success" might be interpreted as about one round in three. Which of the weapons considered is the most accurate for this purpose.

d. What is the effect when the projectile passes through the embrasure. Which type is the most effective.

e. Comparison of weights of weapons and ammunition, rates of fire, noise, flash, ability to be put in action and fired by a single individual is desired.

Note: In case of misfire or hang-fire with P.I.A.T. when used as a shoulder weapon, the firer should be cautioned to move immediately from behind the piece or injury may result.

5. It is also desired that if ammunition is available, the M9A1 grenade be included in this test.

6. It is directed that this Headquarters be notified as to the date tests are to begin, as it is desired to have the observers present for the test.

For the Chief, Ground Requirements Section:

/s/ Geary F. Eppley
GEARY F. EPPLEY,
Lt. Col., G.S.C.,
Assistant Executive,
Ground Requirements Section.

COPY

APPENDIX "A"

SECRET

DECLASSIFIED
Authority NND735022

SECRET

GROUND REQUIREMENTS SECTION

Headquarters
ARMY GROUND FORCES
Army War College
Washington, D.C.

22 September 1943

470 (S) (22 Sep 1943)
GNRQT-11/54894

SUBJECT: Copies of Correspondence on Weapons for Jungle Warfare.

TO: President, Infantry Board, Fort Benning, Georgia.

There are attached hereto copies of the following correspondence, for your information and file:

Memorandum for General George C. Marshall from Colonel W. A. Borden, dated 19 September 1943.

Letter to Colonel M. R. Cox, Field Artillery, from Field Artillery Liaison Officer, Aberdeen Proving Ground, dated 14 Sept 1943.

Letter to Colonel D. B. Sanger, from Infantry and Field Artillery Liaison Officers, Aberdeen Proving Ground, dated 11 Sept 1943.

For the Chief, Ground Requirements Section:

/s/ Geary F. Eppley
GEARY F. EPPLEY,
Lt. Col., G.S.C.,
Assistant Executive,
Ground Requirements Section.

3 Incls.
As listed above.

COPY

APPENDIX "B"

SECRET

DECLASSIFIED
Authority NND735022

WAR DEPARTMENT
Office of the Chief of Staff
Washington, D.C.

Borden/ls

19 September 1943

MEMORANDUM FOR GENERAL GEORGE C. MARSHALL
CHIEF OF STAFF

Subject: Third Progress Report, Development of Weapons for Jungle Warfare

1. Summary: Tests are being vigorously pursued of all types of transportation to establish suitability for jungle purposes for moving weapons and ammunition forward. As a result of further tests of weapons against replicas of Japanese bunkers and slit trenches, it is concluded that

a. The caliber .30 machine gun Model 1919A4, supported by a rifle sling and supplied with a canvas sack for holding machine gun cartridge belt, can be carried forward by hand and fired effectively from the hip. The same is true of the water-cooled machine gun, Model 1917. This was suggested by an officer from the Pacific areas, has been proven, and will provide fire power for the Infantry, while machine guns are being moved forward.

b. A small auxiliary charge recently developed, in cartridge form, successfully boosts the range of missiles fired from grenade launchers (approximately 50%). A satisfactory sight for all grenade launcher-equipped shoulder weapons has been developed.

c. The 60mm, mortar has been provided with a percussion firing device by tapping in to the existing base a rear extension to the mortar. This permits the mortar to be fired by hand at low angles of elevation. Tests of this were initiated during the week and are promising. Tests demonstrate that the 60mm. mortar shell is too small to be effective with a time fuze for airburst and this is being dropped from the present program.

d. The 81mm. heavy walled shell T19 with airburst fuze is very effective. (Range with tube extension 2,800 yards.)

e. Proving Ground tests have established the practicability of firing the 105mm. Howitzer materiel, M3, up to 65° elevation with Zone 4, and 45° with Zone 5. That these angles are obtainable if carriage is dug in and other minor precautions are taken. Instructions have been issued.

f. The 4.2" chemical mortar can be satisfactorily packed by mule for strategic marches, and for short distances can be packed

DECLASSIFIED
Authority NND735022

by man. Means for direct laying have been extemporized. Tests of delay fuzes and heavy walled projectiles are promising, and these items will further expend the usefulness of the 4.2" chemical mortar for artillery purposes.

g. The 2.36" rocket launcher can be provided with a WP filled rocket having the same ballistics as the standard HE rocket.

h. Effectiveness of air attack against exposed positions and bunkers can be improved by providing new airburst time fuzes for bombs, clusters for four 100-lb. bomb to give a concentrated pattern, larger fragmentation bombs in 85-lb. and 265-lb. sizes, butterfly bombs for use against enemy airfields, 500-lb. white phosphorus bombs, and 4 1/2" rockets. The Air Force is building replica targets at Orlando, Florida, to develop most effective use of air weapons against them.

2. Action: The following new items will be immediately manufactured and made available for shipment to the Pacific areas:

a. 5,000 canvas sacks for caliber .30 machine gun cartridge belts.
b. 1,000,000 auxiliary charges for grenade launchers.
c. 200 - 4.2" chemical mortars (the appropriate adjustments to be made in ASF).
d. 200 animal packs complete with accessories for 4.2" chemical mortar.
e. 200 man packs complete with accessories for 4.2" chemical mortar.
f. 5,000 time fuzes for 4.2" ammunition.
g. 10,000 delay fuzes for 4.2" ammunition (as soon as tests prove design).
h. 10,000 - 2.36" rockets filled with WP (as soon as tests prove design).
i. *20,000 airburst time fuzes for bombs.
j. *1,000 clusters for four 100-lb. bombs.
k. *1,600 clusters (6 bombs) 85-lb. fragmentation bombs.
l. *2,000 - 265-lb. fragmentation bombs.
m. *1,000 clusters (24 bombs) Butterfly Bombs.
n. *1,000 - 500-lb. bombs filled with white phosphorus.
o. *36,000 - 4.5" rockets HE, M8.
p. *3,000 - 4.5" rocket Tube clusters.
q. *2,000 - 9" fuze extensions for bombs.
r. *2,000 - 18" fuze extensions for bombs.

* Already under limited procurement.

5 Incls -
Ordnance in two parts.
CWS Rept.
Engr. Rept.
Sig. Corps Rept.

Wm. A. Borden
Colonel, Ordnance Dept.

COPY

DECLASSIFIED
Authority NND735022

FBP/hsa

14 September 1943

Colonel M. R. Cox, F. A.
Requirements Section, Army Ground Forces
Army War College
Washington, 25, D. C.

Dear Malcolm:

When Barjne Furuholmen was up last Saturday he asked if I could get a copy of George Eddy's report on the Japanese pillbox arms development. I attempted to get a copy yesterday, but was unable to do so. However, I have taken some notes from the file copy, and have inclosed the pertinent facts below. The following weapons and ammunition, in addition to standard types, are slated for test:

Weapons

Hand Grenades
Rifle Grenades
.50 Caliber Machine Gun
2.36" Rocket Launcher
4.5" Rocket with 4' plastic tube, this tube to be container and launcher.
60mm Mortar
81mm Mortar
4.2" Chemical Mortar
Modified 81mm Mortar with double length barrel.
37mm AT Gun with recoil mechanism mounted on skis.
75mm Pack Howitzer mounted on skis.
105mm Howitzer, M3A1
105mm Howitzer tube M3 and recoil mechanism mounted on 75mm Pack Howitzer Carriage, M1.
37mm AT Gun, M3, modified to take the 60mm Mortar tripod and 81mm Mortar base plate. This is for use as a spigot mortar.
4.5" Rocket with 10' launcher mounted on 60mm tripod and 81mm bipod.
4.5" Rocket Launcher 4' long on .30 caliber machine gun mount.
4.5" Rocket in a short tube which acts as both container and launcher.

Ammunition.

Air burst fuze and adapter for 60mm Mortar, 81mm Mortar and 4.2" Chemical Mortar.
Long delay fuze with delay of .15 seconds for both 81mm Mortar and 4.2" Chemical Mortar.

APPENDIX "B"

COPY

DECLASSIFIED
Authority NND735022

90mm projectile modified so as to weigh 17 lbs. for use in 81mm Mortar.
A 23 lb. projectile made by welding two projectiles M6 end to end for use with 81mm Mortar.
A 28 lb. projectile made by inserting a lead cylinder in the Standard M56 projectile for use with the 81mm Mortar.
A 30 lb. projectile made by welding a piece of steel tubing to the M56 shell body for use with the 81mm Mortar.
Modification of the Standard 105mm Howitzer projectile for use with the 4.2" Chemical Mortar.

The following have shown themselves to be extremely effective weapons against Japanese pillboxes:

Small arms fire with tear gas
Smoke screen when using direct fire.
4.5" Rocket for indirect fire.
81mm Mortar for indirect fire.
105mm Howitzer, M3, for indirect fire.

It is believed the 155mm Howitzer, M1, might be an excellent weapon due to its tremendous fire power, provided it can be broken down into suitable loads for airborne use. Development work is being done on this weapon at the present time with a view to its use.

The following is a verbatim copy of the summary of the report:

"There are two methods of bringing small arms, mortar and artillery fire to bear against Japanese bunkers, namely, direct fire and plunging fire.

1. The 81mm Mortar, with the following changes, can be made into a more effective and versatile weapon by

a. Increasing the length of the tube.

b. Increasing the range for the 7 lb. M43 projectile from 3200 to 5400 yards.

c. Increasing the range of the 11 lb. M56 projectile from 2600 to 4000 yards.

d. Increasing the weight of the projectile to as much as 28 lbs.

e. Providing a delay fuze with .15 seconds delay.

f. Providing a time fuze for air burst of HE and chemical projectiles.

DECLASSIFIED
Authority NND735022

With these changes, which can be made immediately, the 81mm Mortar is an extremely versatile and effective weapon for jungle warfare, and for the reduction of Japanese bunkers.

"2. The 4.5" Rocket, when provided with a 4 foot tube which serves as both ammunition container and projector, and when fired in multiple, is one of the most effective weapons for reduction of Japanese bunkers, when used in direct fire at ranges of 1000 yards or under. In firing this round, the projectile may be placed on the ground, in the crotch of trees, or mounted on the .30 caliber machine gun mount. Greater accuracy can be obtained by the use of a 10 foot tube mounted on a machine gun mount.

"3. The 4.2" Chemical Mortar should be considered for the reduction of Japanese bunkers, provided the ammunition is fuzed with a long delay fuze. Its effectiveness against personnel and fox holes may be materially increased by providing it with a time fuze for air bursts. This mortar cannot be used for close-in work on bunkers and its dispersion appears to be greater than the 81mm Mortar. Its weight is excessive compared with the 81mm Mortar, modified as noted above.

"4. The 105mm Howitzer, M3, Airborne, may be fired at elevations up to 60°. It is extremely accurate and effective against Japanese bunkers. The versatility of this weapon may be increased by mounting it on the 75mm Pack Howitzer carriage for direct fire purposes. The 105mm Howitzer, M3, on the 75mm Howitzer Carriage, while limited in elevation, may be given the desired elevation by digging in the trails. It provides a weapon 800 lbs. lighter than the standard unit, which weighs approximately 2600 lbs.

"5. A slightly effective spigot mortar may be provided by using the 37mm AT Gun, M3, with a 60mm Mortar bipod and 81mm Mortar base plate, modified for projecting a 20 lb. projectile.

"6. A light 37mm complete unit without wheels or axle may be suitable for use in jungle warfare by providing a tube of very light weight and reducing the muzzle velocity of standard ammunition to 1500 f.s. and by adapting the end of the tube for use as a spigot mortar for projecting a 20 lb. projectile of the spigot type.

"7. Another promising weapon may be obtained by incorporating tear gas in the .30 caliber and .50 caliber ammunition."

The following recommendations were made:

DECLASSIFIED
Authority NND735022

"1. Development and issue of packs for carrying ammunition in order that the bearer's hands may be free.

"2. Development and issue of paracrates for ammunition and materiel.

"3. Increased use of observation airplanes for control of indirect fire.

"All items recommended above should be made available for immediate issue."

In considering the above report, Col. Zehner and I have concluded that too much stress has been placed on the use of indirect fire and high angle fire methods for reduction of Japaness pillboxes. The firing to date indicates that an excessive quantity of ammunition fired at high angles is required in order to obtain effective hits on an emplacement. While these weapons have merit in reducing area targets, we feel that direct fire methods will have to be used in accomplishing missions of this type. It is believed that weapons firing high angle fire should be used in preparatory firing, then followed by smoke and last, assault with direct fire weapons.

F. B. PORTER
Colonel, F.A.
Liaison Officer

COPY

APPENDIX "B"

CONFIDENTIAL

DECLASSIFIED
Authority NND735022

FBP/hsa

11 September 1943

Colonel D. B. Sanger
Requirements Section, Army Ground Forces
Army War College
Washington, D. C.

Dear Col. Sanger:

Reference the Japanese pillbox program in which you are interested, during the past week a number of tests of various types of weapons have been made with a view to determining their suitability for assault work on Japanese pillboxes. The list I sent you last week has been somewhat expanded and will be covered in a final report.

If you will consider the report submitted today as a partial report, we will attempt to show you what has been done and give you some of our impressions. The following includes the list which was submitted informally to you sometime back.

Caliber .50 Machine Gun

This weapon was set up at a distance of approximately 70 yds. from the fire bay of a Japanese pillbox and fired at both the embrasure and earth above it. No penetrations of the bunker were attained with any of the following types of caliber .50 MG projectiles: AP, incendiary, explosive, CN filled bullets. When firing these projectiles directly through the embrasure, very little damage was done. Only a few hits were obtained on silhouette targets within the pillbox with the explosive type bullet. No damage was done with the other types, except for hits on the logs in the back of the pillbox. The gas in the caliber .50 CN filled bullets effected the eyes of personnel who entered the dugout immediately following the firing to such an extent as to partially blind them. Provided it can be transported to the jungle area, this weapon is partially effective as a direct fire weapon.

37mm Gun, M3

This weapon has been modified by cutting off about 1/3 of the barrel and then machining the outside of the tube sufficiently to permit a German stick grenade to be slipped over the muzzle. About ten rounds of standard HE ammunition were fired from this weapon at the pillbox with a range of about 60 yds. These rounds hit in and around the embrasure. No damage was done inside the pillbox, however, the embrasure was torn up somewhat. The stick grenade has not been

DECLASSIFIED
Authority NND735022

fired with this modified weapon to date. Other modifications of the 37mm gun are as follows:

1. 37mm gun with short, cut down tube, mounted on 81mm mortar base plate so as to act as a trench mortar, using 60mm mortar bipod for its elevating mechanism. This was also designed to fire the stick grenade.

2. 37mm gun on wooden sleigh with free recoil.

3. 37mm gun and recoil mechanism on wooden sleigh.

None of the last three items have been tested to date against pillboxes.

60mm Mortar.

This weapon was fired at high angle of elevation against a pillbox, but due to the size of the projectile, little effect was recorded on the outside of the pillbox and none on the inside. This weapon is apparently of little value for this purpose.

81mm Mortar

The standard 81mm mortar was fired at a Japanese pillbox from a range of approximately 200 yds., and a number of hits on the earth covering and in the area about the pillbox were made. Out of 120 rounds fired, only 3 hits were made near the embrasure, none of which had any effect on silhouettes inside the pillbox. In addition, no damage was done to the pillbox. We believe that the standard 81mm projectile is too light for good effect on a strongly constructed pillbox.

With a view to using a slower burning powder and a heavier projectile, the standard 81mm tube has been modified by doubling its length. Several types of projectiles are under consideration for this modified 81mm mortar for the purpose of increasing its effectiveness. Briefly, these are listed as follows:

1. Standard mortar projectile with M52 P.D., instantaneous fuze.

2. Standard projectile with long tail weighing about 28 lbs. equipped with P.D. fuze set for .15 seconds delay.

COPY

APPENDIX "B"

CONFIDENTIAL

DECLASSIFIED
Authority NND735022

3. Two or three standard projectiles fitted end to end so as to increase weight and explosive capacity.

4. Modified 90mm projectile weighing approximately 18 lbs.

Only two types of these modified 81mm projectile have been fired at a Japanese pillbox to date and these at one constructed with one layer of logs and covered with about 3 feet of earth. Out of about 30 rounds fired from a range of 500 yds., 4 or 5 hits were obtained on the target. Two rounds hit in such a way as to damage the passageway leading into the interior of the pillbox. Logs and dirt fell into the passageway, but did not damage it beyond use. Two other rounds which hit near to the gunner's position, penetrated the pillbox and demolished the embrasure, but damage was such that the pillbox could be quickly repaired for further use. These projectiles evidently exploded before entering the interior of the pillbox, because no hits could be found on the silhouette targets placed within the box. Approximately 10 rds. of 90mm ammunition were satisfactorily fired from this mortar. Of these, two or three hits were obtained on the top of the pillbox, all of which penetrated to a depth of approximately 3 feet and burst in the log covering. The pillbox was damaged, but not beyond repair or usefulness. Further test will be made with these modified projectiles next week.

75mm Pack Howitzer, M1

This weapon has been modified as follows for the test: 75mm Pack Howitzer, M1, mounted on wooden sleigh for free recoil; 75mm Pack Howitzer, M1 (tube bored out to accommodate 81mm projectile). However, no firing has been done against pillboxes to date.

105mm Howitzer, M3

This weapon was fired, using a modified Charge I, at a range of approximately 600 yds. and the piece dug in in such a way as to allow high angle fire. A number of rounds fired at a pillbox having a double layer of logs and 3 feet of earth covering, resulted in only one direct hit just above the entrance. The projectile penetrated approximately 2 feet of earth and 2 feet of logs, and burst in the passageway doing considerable damage, but not destroying the pillbox. All other rounds burst in and around the pillbox within a radius of approximately 20 yds., but did no damage. We believe this weapon will give satisfactory results against these emplacements provided it can be transported through the jungle to the place where needed.

COPY

APPENDIX "B"

CONFIDENTIAL

DECLASSIFIED
Authority NND735022

4.5" Rockets

This projectile, mounted in a fiber container which acts as both carrying case and launcher, was fired at the embrasure on the pillbox at a range of approximately 75 yds. Of five rounds fired, one round entered the embrasure and would have effectively destroyed personnel therein if it had been loaded with HE. A number of launchers of various lengths have been developed for this use, but have not been fired against the pillbox to date. It is generally conceded that if the 4.5" rocket is to be used for this type of operation, it should be fired from its container. This container should have a small battery and a length of wire for firing a rocket electrically, and perhaps a very crude sight on the outside of the container.

Bazookas

These have not been tested against the pillbox to date.

Rifle Grenades.

Two rifle grenades M9A1 have been fired to date at the embrasure of the pillbox. Hits in the embrasure were not obtained. We believe that rifle grenades can be used effectively against these pillboxes if hits can be obtained in or near the embrasure. There are three points which require additional work before the rifle grenades can be used accurately and effectively:

1. A good sight for firing grenades is needed on each weapon.

2. The M3 blank cartridge needs to be improved in order to attain uniform velocity (at present unburned powder is noticeable in the chamber and bore of the rifle).

3. An improved fuze is necessary, preferably combination time and impact fuze, in order that grenades will go off in the soft ground impact of the jungle.

Chemicals

In order to find what use could be made of chemical agents and chemical warfare equipment, a demonstration was held at Edgewood Arsenal on 9 September. Practically every type of chemical weapon and projectile was exhibited for display and both smoke and HE shell used (see the inclosed program for further details).

COPY

APPENDIX "B"

CONFIDENTIAL

DECLASSIFIED
Authority NND735022

CONFIDENTIAL

It was interesting to note that the 4.2" chemical mortar was unable to hit one of these pillboxes from the ranges fired, and that all other weapons, including airplane bombs, had little or no effect on the Japanese type pillbox. The flame thrower, the 4.2" chemical mortar and the rifle grenade with WP filling, were the best weapons exhibited. The 4.2" chemical mortar will be modified so as to break down into 60-lb. loads and will be given a further test for jungle warfare use.

The most important feature illustrated by the demonstration was the use of smoke for screening the dugout from the position of troops moving up for assault. Rifle grenades filled with WP, fired from a range of approximately 200 yards, effectively screened the dugout from our view. Other types of weapons projecting smoke also concealed or hid the dugout from our view.

Vehicles

A demonstration was held yesterday of various types of vehicles which might be used for transporting weapons in jungle warfare. These involved track laying and wheeled vehicles of non-standard types which were light in weight and had good flotation qualities for covering soft ground. Complete details of these vehicles will be forwarded some time next week. The following vehicles showed some promise:

1. A modified 1/4 ton, 4x4, truck with full track which gave a ground pressure of .8 lbs./sq. in.

2. A Crosley Mule, a small rubber wheeled, rubber track vehicle weighing less than 600 pounds, which could be used as a prime mover for such weapons as the 75mm Pack Howitzer, M8, or trailers carrying other types of weapons.

3. Several small tractors with rubber tracks, all of which weighed less than 3000 pounds.

The Light Airborne Tank T9E1 was included in this demonstration. It is possible that this vehicle might have an application as a gun motor carriage for the 105mm Howitzer, M3.

Among the wheeled vehicles displayed were the 1/4 ton, 6x6, (T14), the light weight Crosley jeep (1300 lbs.) and the Kaiser jeep (1500 lbs.).

F. B. PORTER
Colonel, F.A.
Liaison Officer

COPY

APPENDIX "B"

E.M. ZEHNER
Lt. Col., Infantry
Liaison Officer

CONFIDENTIAL